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# **The Gap In Water and Wastewater Infrastructure and the Changing Face of Utility Management**

New Jersey, AAM Seminar, May 3- 4, 2004

Steve Allbee, USEPA



# The Organization of This Presentation

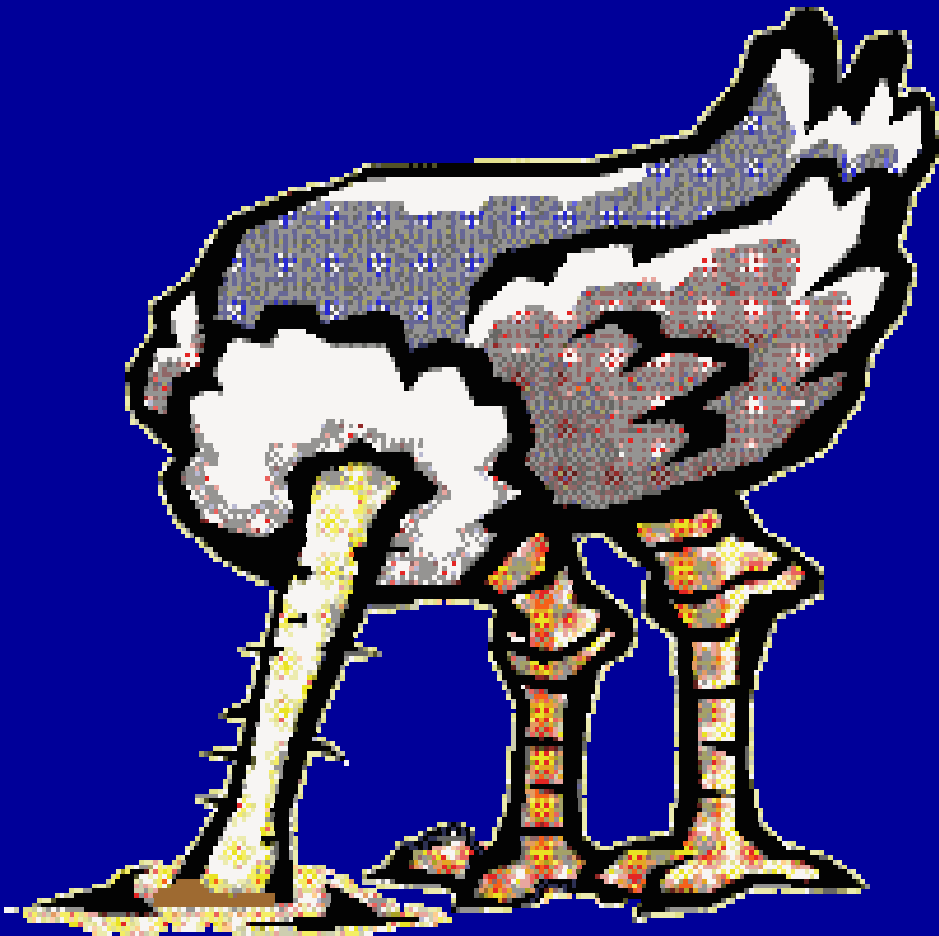
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- ◆ The Gap Analysis and situation assessment of water and wastewater Infrastructure issues.
- ◆ The State Revolving Fund Program.
- ◆ The emergence of a sustainable systems paradigm.



# The First Stage in Confronting a Problem Is Recognizing the Problem Exist

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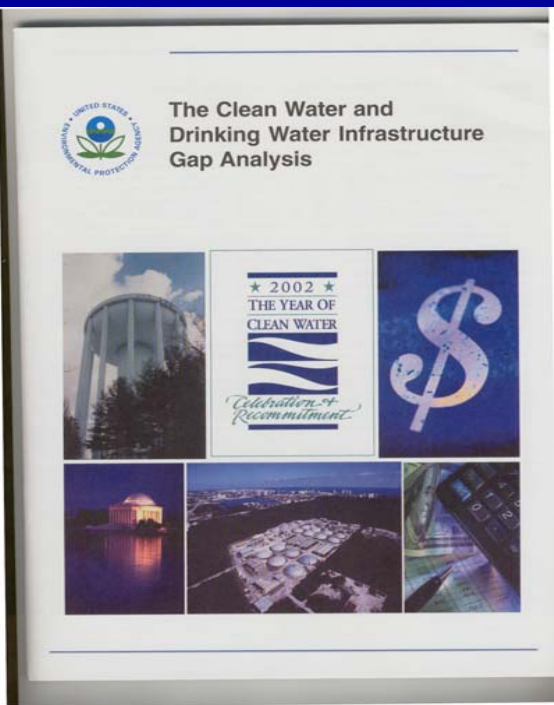
A “Gap Analysis”  
was used to  
establish a  
common  
quantification of  
the challenge



# ***The Gap Report***

## **Released At WEFTEC 2002**

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- ◆ **Purpose -- To reach a common quantitative understanding of the potential magnitude of investment needed to:**
  - **Address growing population and economic needs, and**
  - **Renew our existing aging infrastructure.**
- ◆ **The data is comparable, at order of magnitude level, with WIN & CBO reports.**

<http://www.epa.gov/owm/gapreport.pdf>



# **The Report Is Intended to Provide a Transparent Presentation of the Numbers**

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- ◆ **Estimates are made for water and wastewater, investment, cost and payments (2000-2019).**
- ◆ **Gap = Needs (-) Spending.**
- ◆ **The “gap” is not inevitable. It can be, at least mitigated, with significant changes.**



# The Findings For The 20 Years (2000-2019)

## No Revenue Growth Scenario

Total Payment Gap (20 Years) (Average in Billions of Dollars)		
	Clean Water	Drinking Water
Capital	\$122	\$102
O&M	\$148	\$161
Total	\$271	\$263

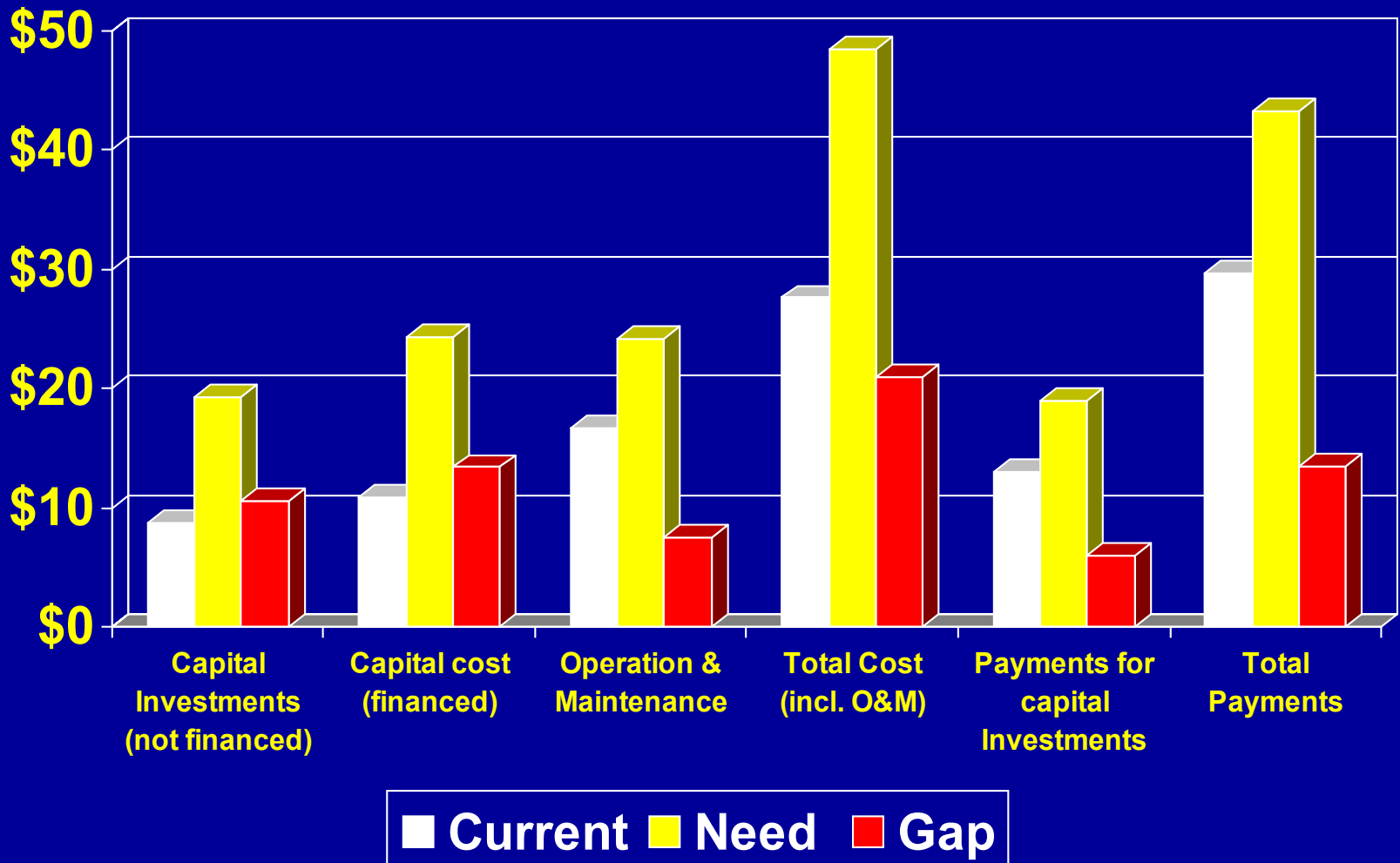
## Revenue Growth Scenario

Total Payment Gap (20 Years) (Average in Billions of Dollars)		
	Clean Water	Drinking Water
Capital	\$21	\$45
O&M	\$10	\$0
Total	\$31	\$45

(Annual Rate of Increase - 3% Real)



*An Example In Annual Terms:*  
**The Midpoint Estimates: Needs and Gaps Annual Averages  
Investment, Cost and Payments (2000-2019)  
The Wastewater Annual Shortfall in (\$ in Billions)**





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# How Did This Challenge Come About?



# The Recent History

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## **In the 1970s, The Country Faced Significant Water Quality Problems and Major Policy Changes Were Undertaken:**

- ◆ The Federal government took on a larger role as a regulator and became a more significant source of funds for capital improvements
- ◆ A new permit process was established to control discharges to the nation's waterways
- ◆ Very large investments were made in the treatment of industrial waste and in the upgrading of the public wastewater systems



# **The Primary Drivers of the Current Gap**

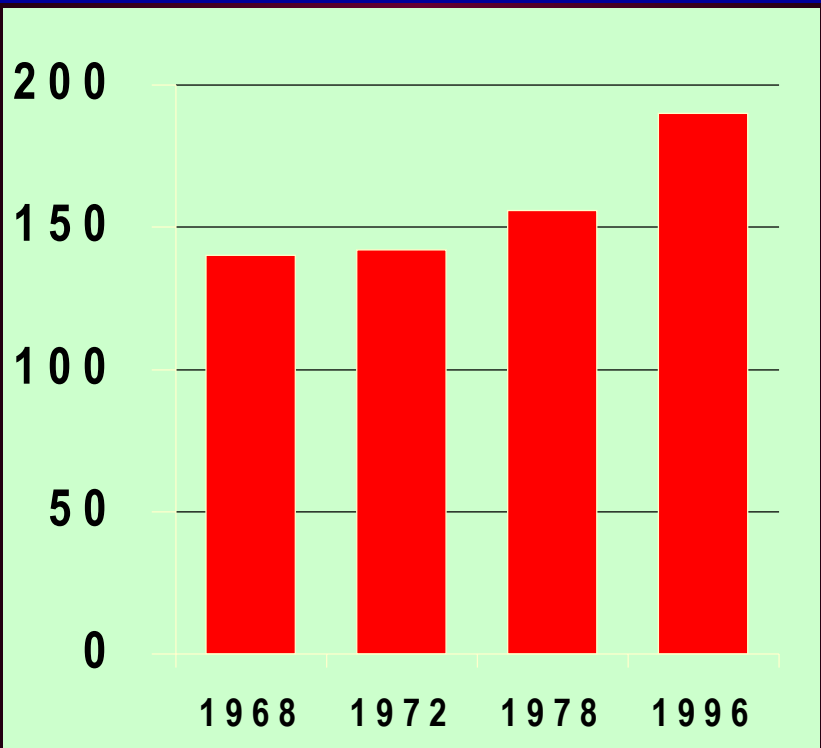
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- ◆ **Another round of new investments to deal with a growing population & economy.**
- ◆ **For the first time, having to substantially adjust financial approaches, to meet increasing demands for maintenance, repair, renewal and replacement associated with aging systems.**



# For The Last Several Decades The Focus

## Serving More People (In Millions)



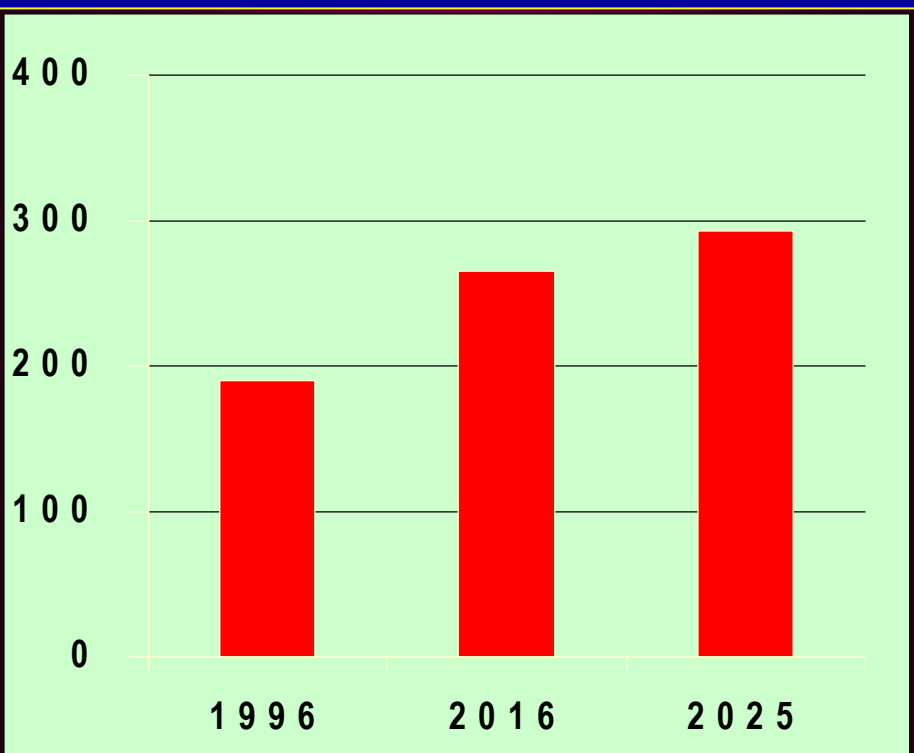
Higher levels of treatment				
	72	82	92	96
Total Plants	19,355	15,662	15,613	16,024
Less than Secondary	13.4%	19.9%	5.6%	1.1%
Secondary	48.7%	50.7%	58.2%	58.6%
More than Secondary	2.4%	17.6%	23.6%	27.6%
No Discharge	2.4%	10.2%	12.7%	12.7%

**Source: USEPA, Progress in Water Quality:  
An Evaluation of the National Investment  
in Municipal Wastewater Treatment, June 2000.**

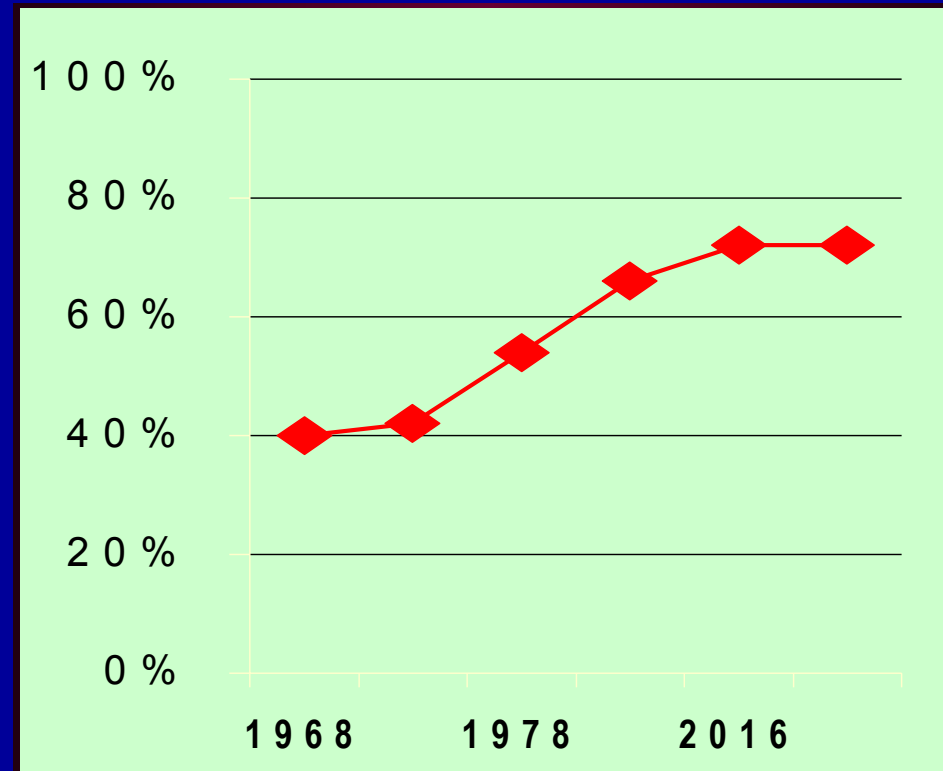


# The Emerging Challenge

## Additional Served Population 1996 to 2025 (In Millions)



## Leveling Off of $BOD_u$ Removal Efficiencies

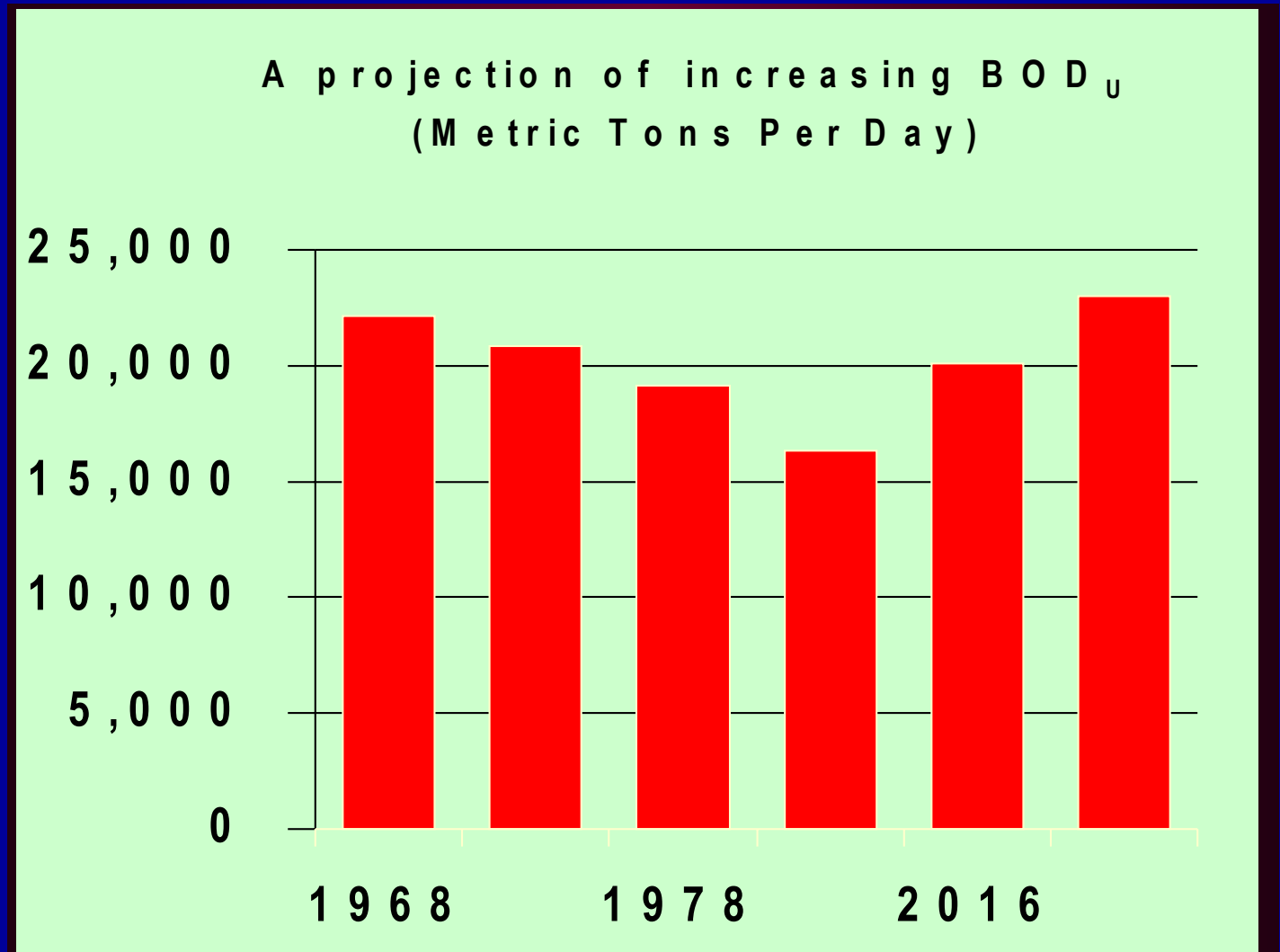


Source: USEPA, Progress in Water Quality:  
An Evaluation of the National Investment  
in Municipal Wastewater Treatment, June 2000.<sup>12</sup>



# The Additional Growth, Could Produce by 2016, BOD Loading Rates Similar to the Mid-1970s

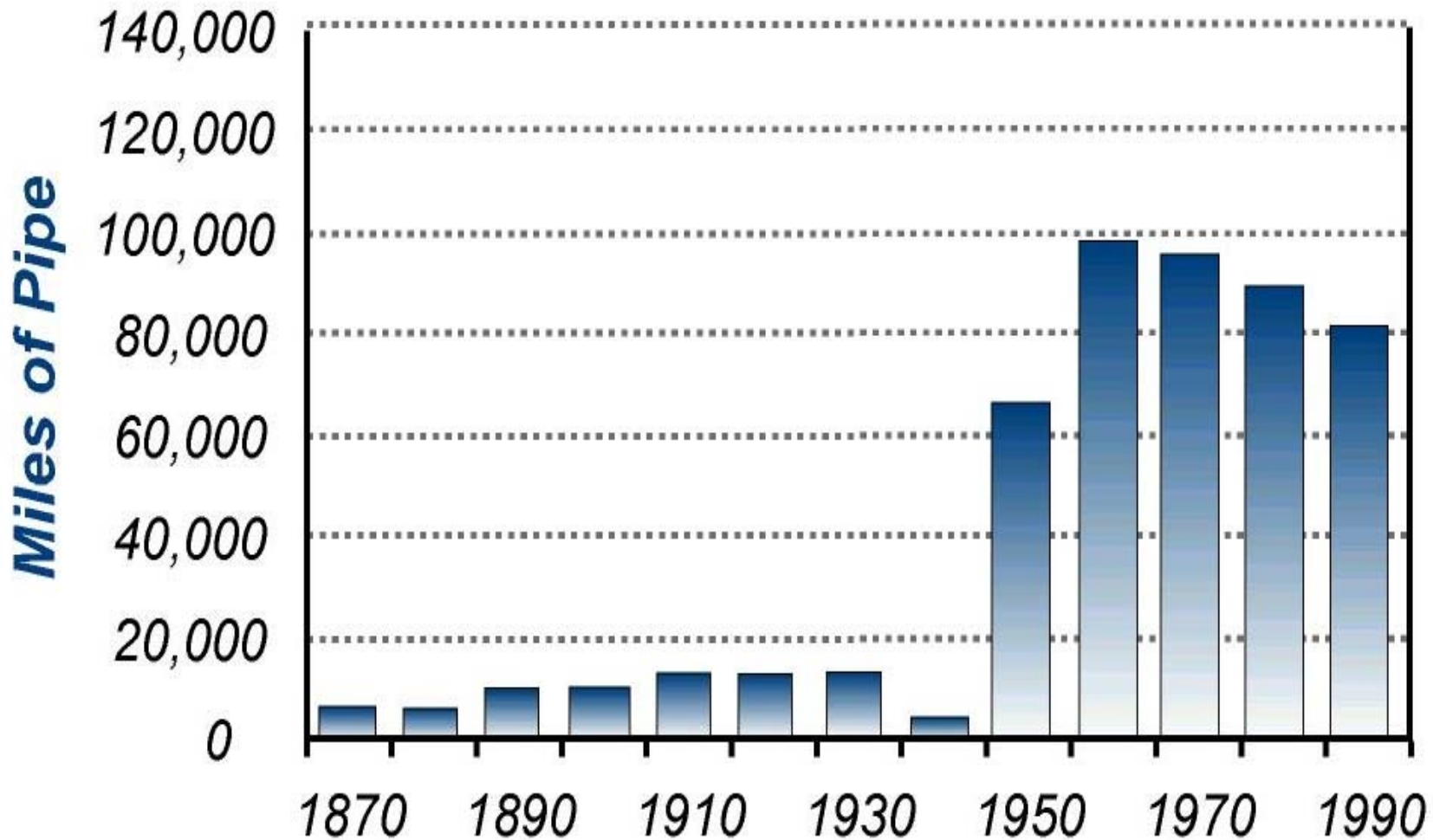
**Source: USEPA, Progress in Water Quality: An Evaluation of the National Investment in Municipal Wastewater Treatment, June 2000.**





# Aging Assets Are The Larger Fiscal Challenge

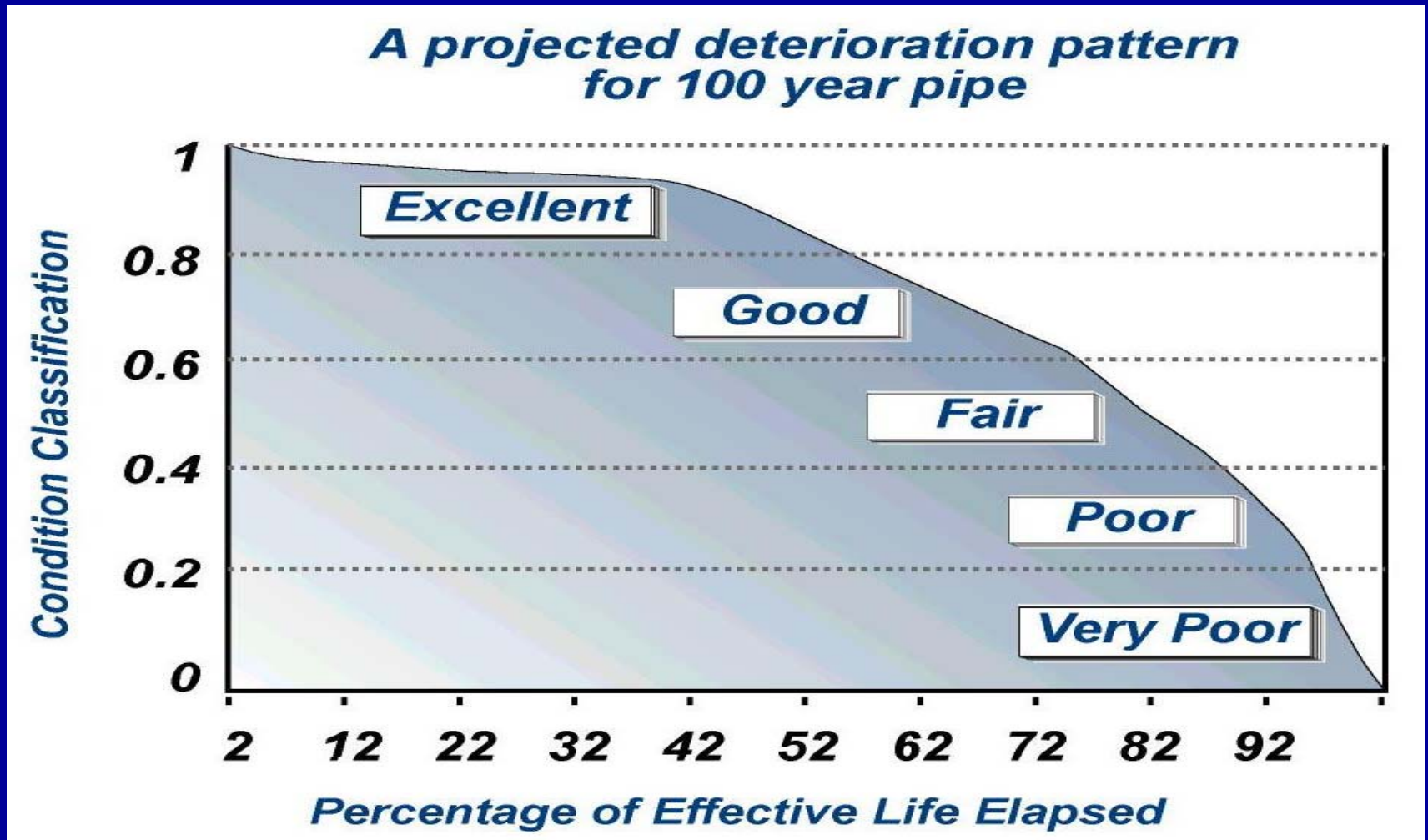
## The Pipe Network Reflects the Demographics of Urbanization





# Pipes Can Last a Very Long Time and Still Be Excellent

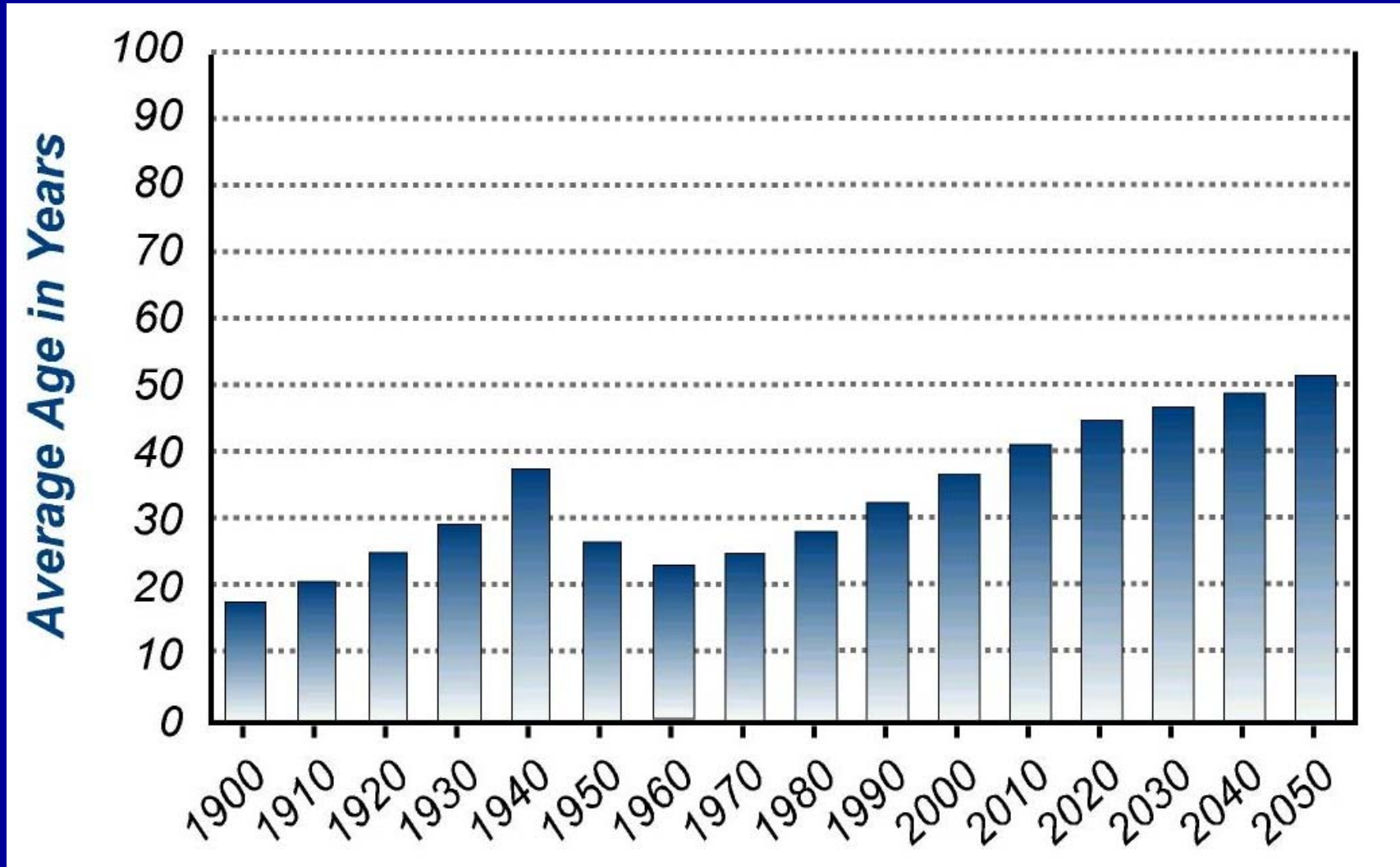
## But, All Physical Assets Deteriorate and the Aging Network Will Demand Investment, Just To Keep Current Service Levels





# A modeling of the overall age of the network:

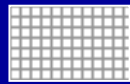
**Even if the pipes are replaced on an schedule the average age of the pipe network will increase until 2050**





# More Pipe in Lower Condition Levels Will Impact Costs and Performance

The Average Age Of Pipe Will Increase Until About 2050



Excellent



Good



Fair



Poor

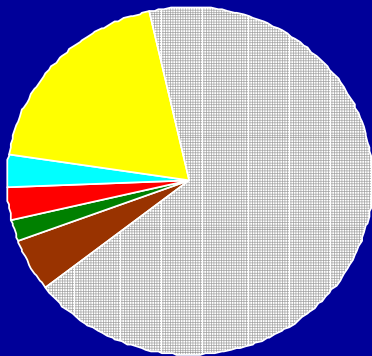


Very Poor

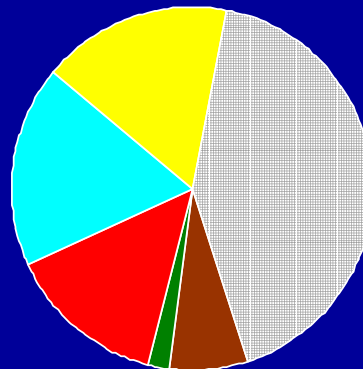


Life Elapsed

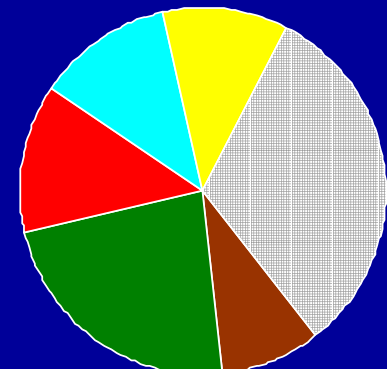
1980



2000

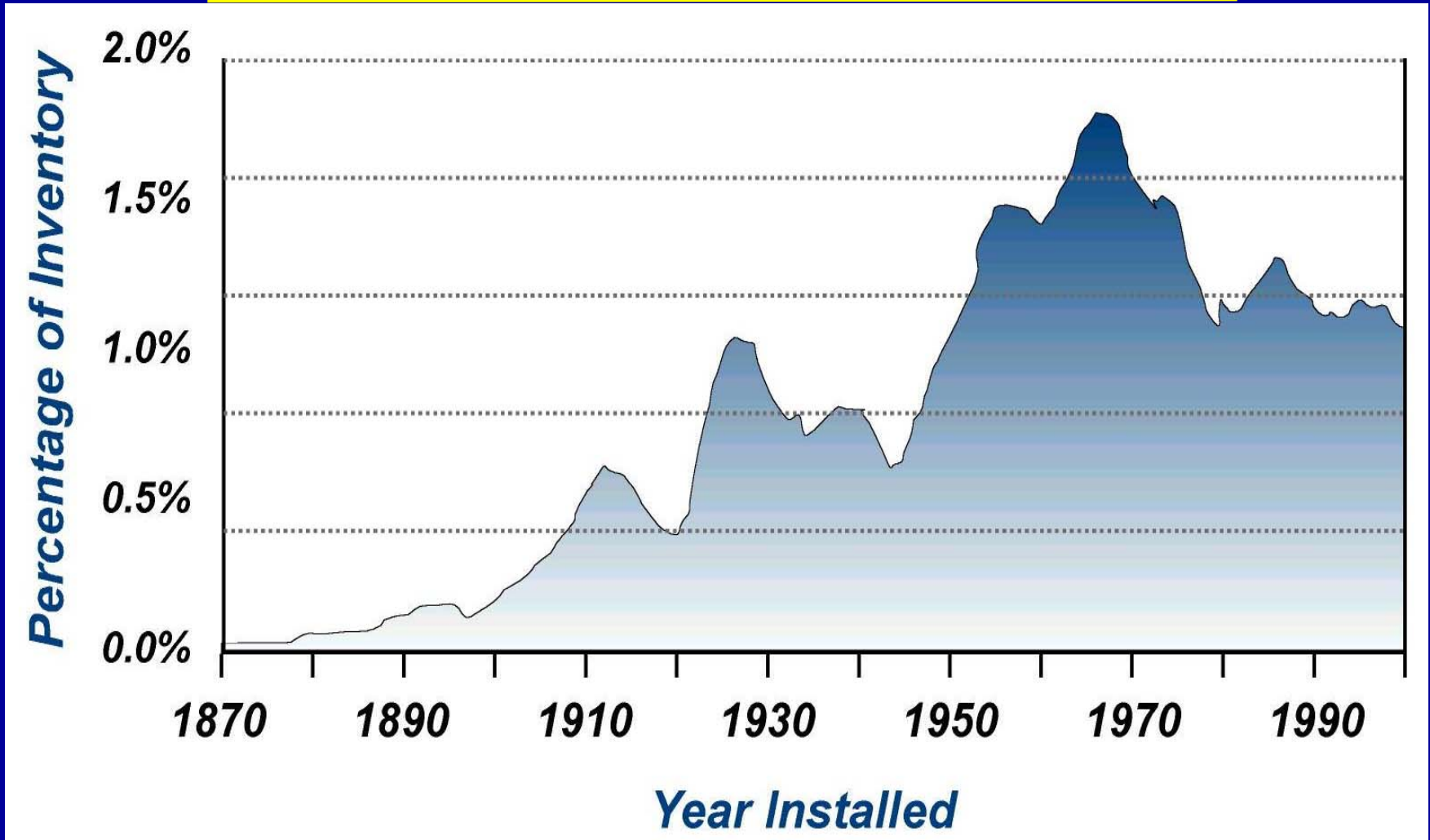


2020

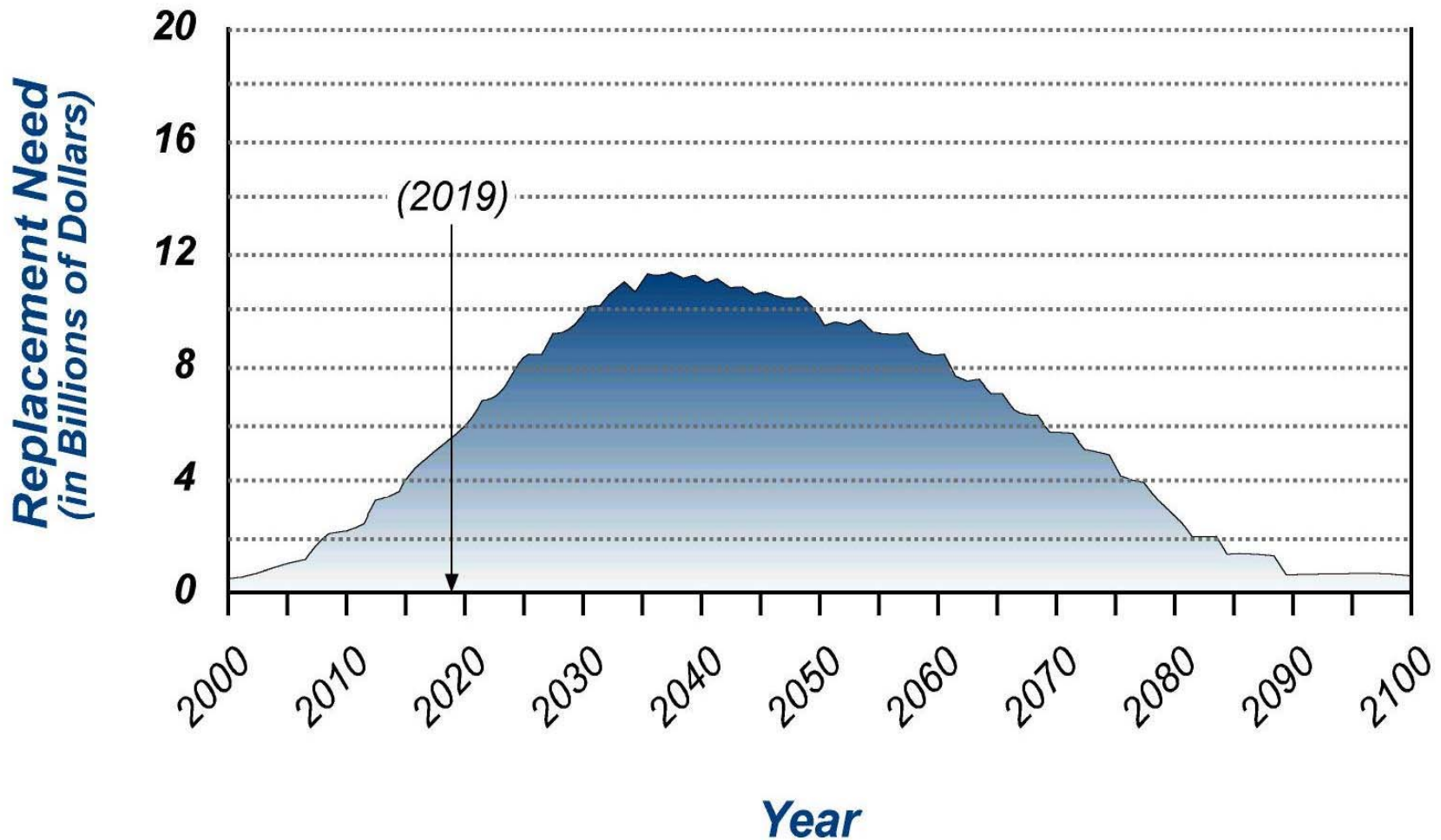




# The Demographics of the Drinking Water Systems: Present a Similar Picture



# The Replacement Needs Peak After the "2000 - 2019"





# **This Is Not Currently a "It's All Broke Crisis" But, Well on the Way to a Systemic Problem**

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- ◆ **Our systems are aging.**
- ◆ **The status quo will result in increased public health and environment risk.**
- ◆ **Failure to manage the assets based on life cycle costs will require more revenues over the long term to meet service objectives.**



# Confronting the Challenge Demands A Focus On Achieving Sustainable Infrastructure

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- ◆ Better Management
- ◆ Water Efficiency
- ◆ Full Cost Pricing
- ◆ Watershed Approach



# **A Significant Challenge?**

## **-- Where Do We Go From Here --**

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- ◆ **The focus must be about:**
  - **Sound sustainable fiscal arrangements.**
  - **Broad application of best practices.**
  - **Investments in innovation to lower costs.**
- ◆ **EPA is collaborating on various activities to promote**  
**Asset Management & Environmental Management Systems.**



# EPA's State Revolving Fund Programs Contribute to Meeting The Fiscal Challenges

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# **The Fund Is Designed to Provide Several Forms of Financial Assistance.**

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- ◆ Loans
- ◆ Refinancing of existing debt
- ◆ Purchase of local debt
- ◆ Bond insurance
- ◆ Guarantee of local debt
- ◆ Guarantee of debt for sub-state revolving funds
- ◆ Source of revenue or security for revenue or general obligation bonds issued by the state ("leveraging")



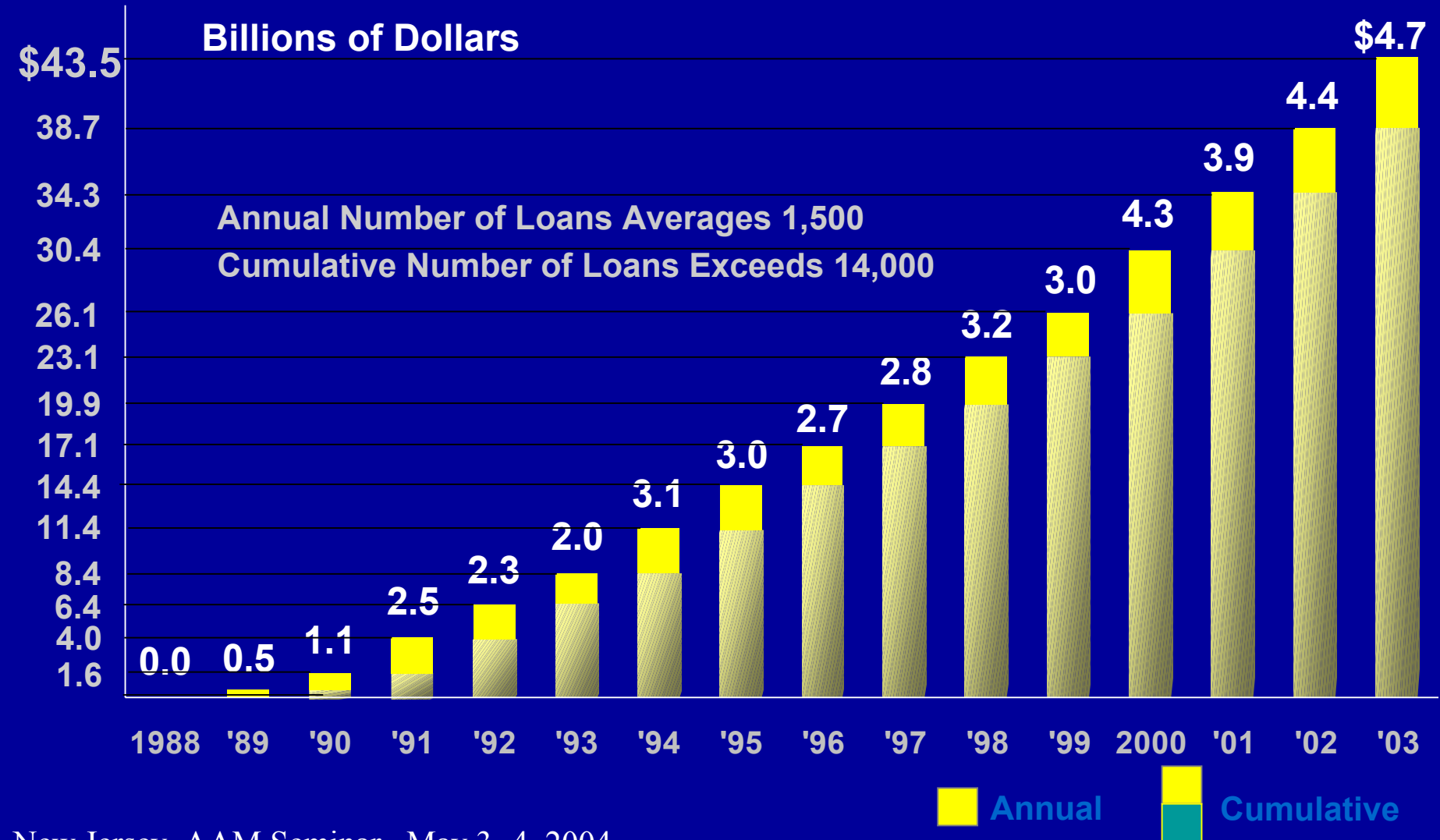
# The SRF Financial Terms Are Attractive

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- ◆ Cover 100% of eligible cost -- no local match
- ◆ Only capital-type projects are eligible
- ◆ Interest rates
  - May range from 0 percent to market rate
  - States set rates based on state's cost of capital, state law, or recipient's ability to repay
- ◆ Loan repayment
  - Up to 20-year term
  - Begins up to 1 year after project start-up
  - Wide flexibility in repayment sources
  - All repayments of loan principal and interest must return to the CWSRF



# CWSRF Cumulative Assistance Has Reached \$43.5 Billion

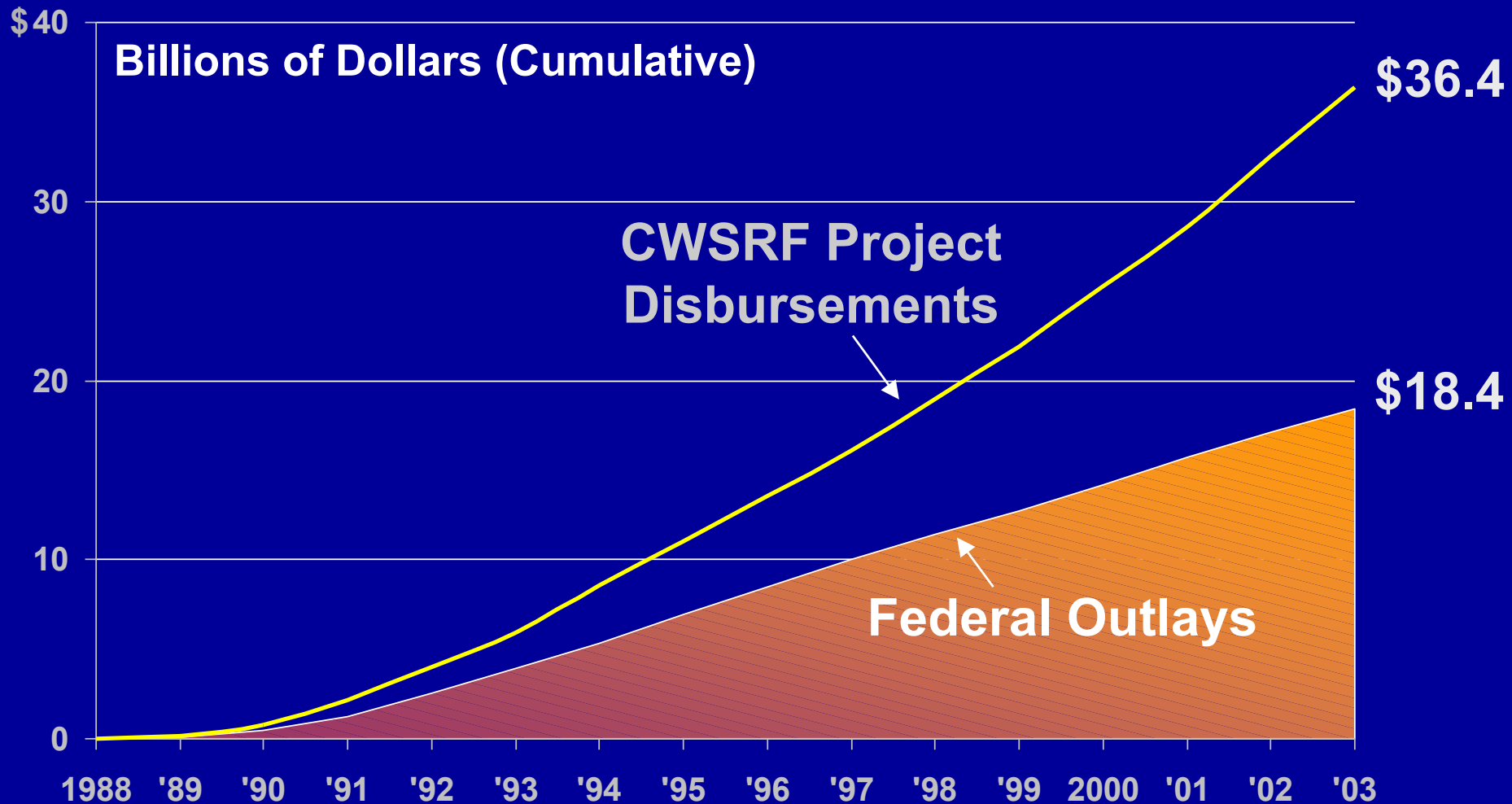


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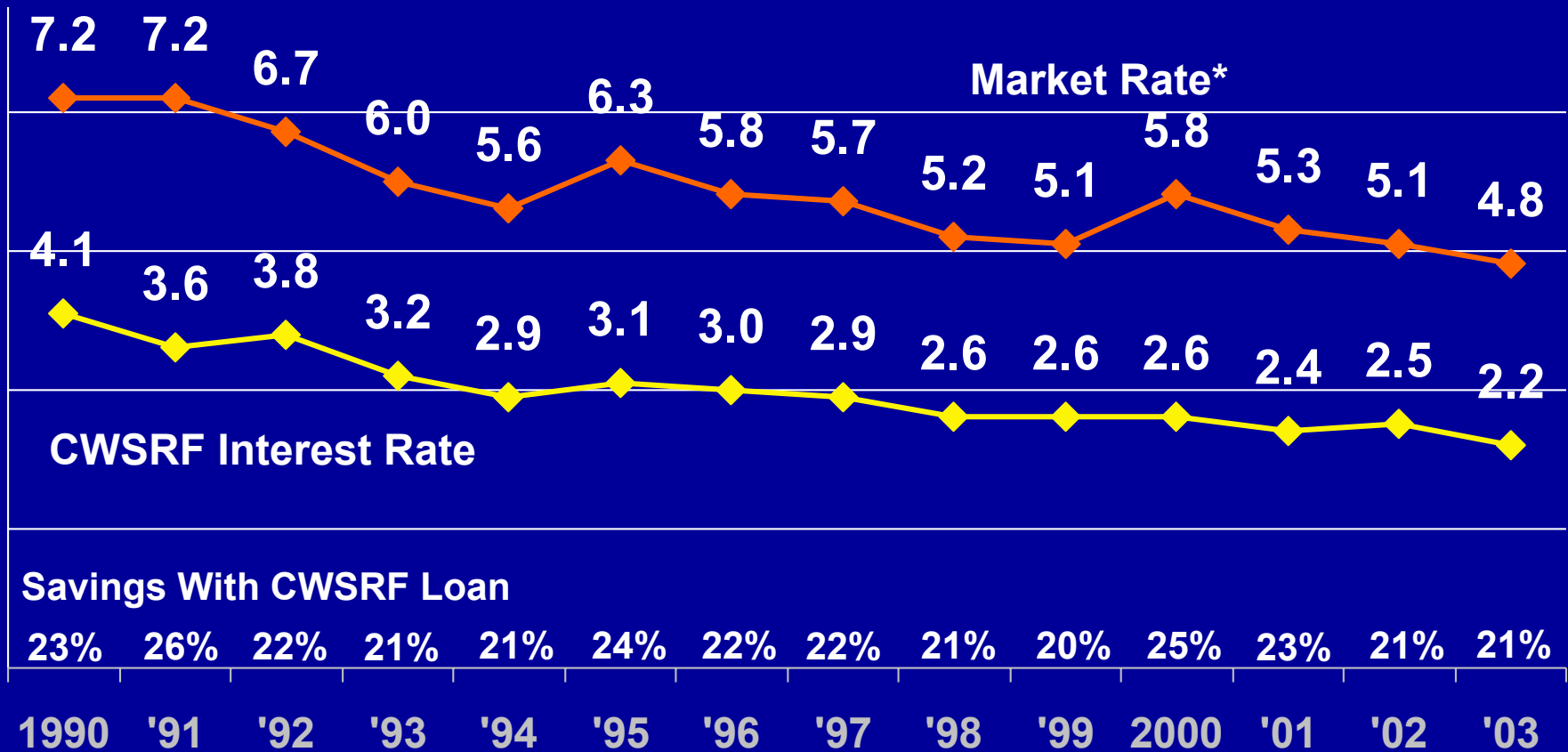


# CWSRFs Return 1.97 Times the Federal Investment





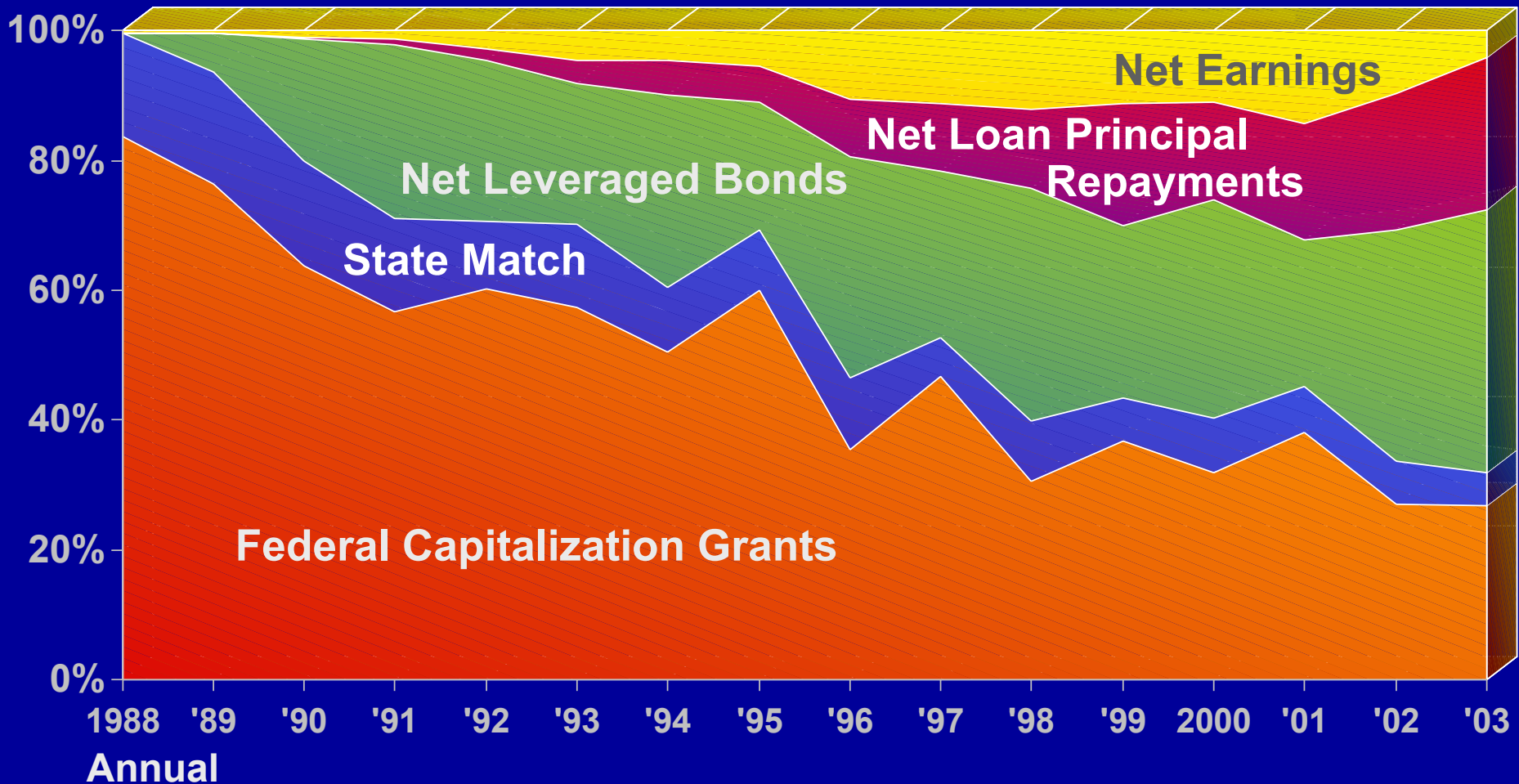
# CWSRF Loans Save Communities 21% on Average



\*Market rate is measured as the Bond Buyer 20-Bond GO Index.

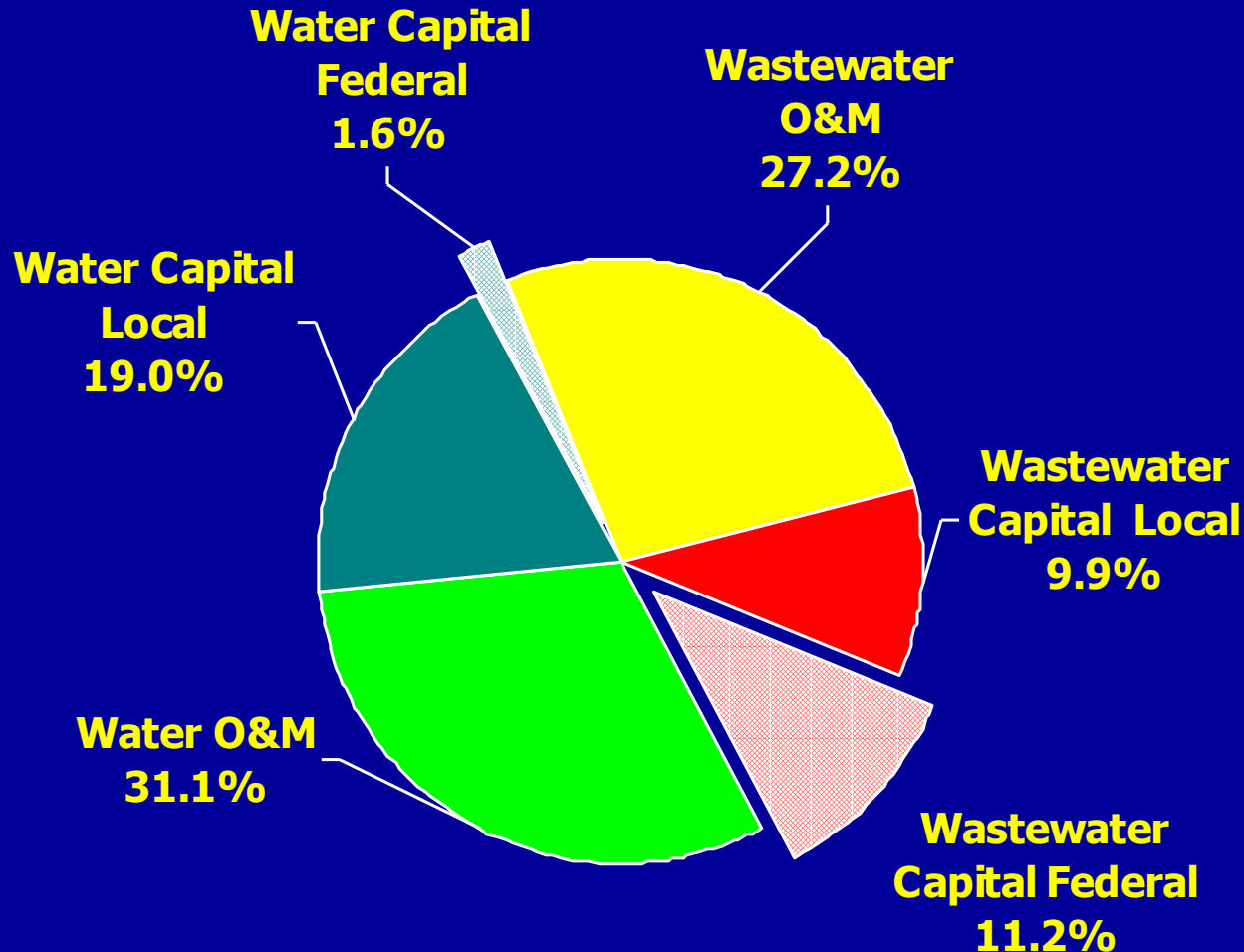


# The Relative Share of Federal Funds Has Declined Over Time





# In the Larger Context, the Vast Majority of the Needed Resources Are Local Sources



**Sources of funds from 1956 to 1994**



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# **Asset Management Is A Critical Building Block For The Future Of Water Utility Management**



# **Over The Long Term Striving For Sustainable Organizations Will Lead to Significant Institutional Changes**

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- ◆ **Policy and organization.**
- ◆ **Governance concepts.**
- ◆ **Structure.**
- ◆ **Asset Management.**
- ◆ **Risk assessment.**
- ◆ **Setting service and performance objectives.**
- ◆ **Monitoring performance.**
- ◆ **Establishing resources and budgets.**



# **A Significant Part of The Rationale of A More Comprehensive Framework Is Embodied In Three Concepts**

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## **◆ Ecologically Sustainable Development**

- Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained and the quality of life for both present and future generations is increased.

## **◆ Environmental Management Systems**

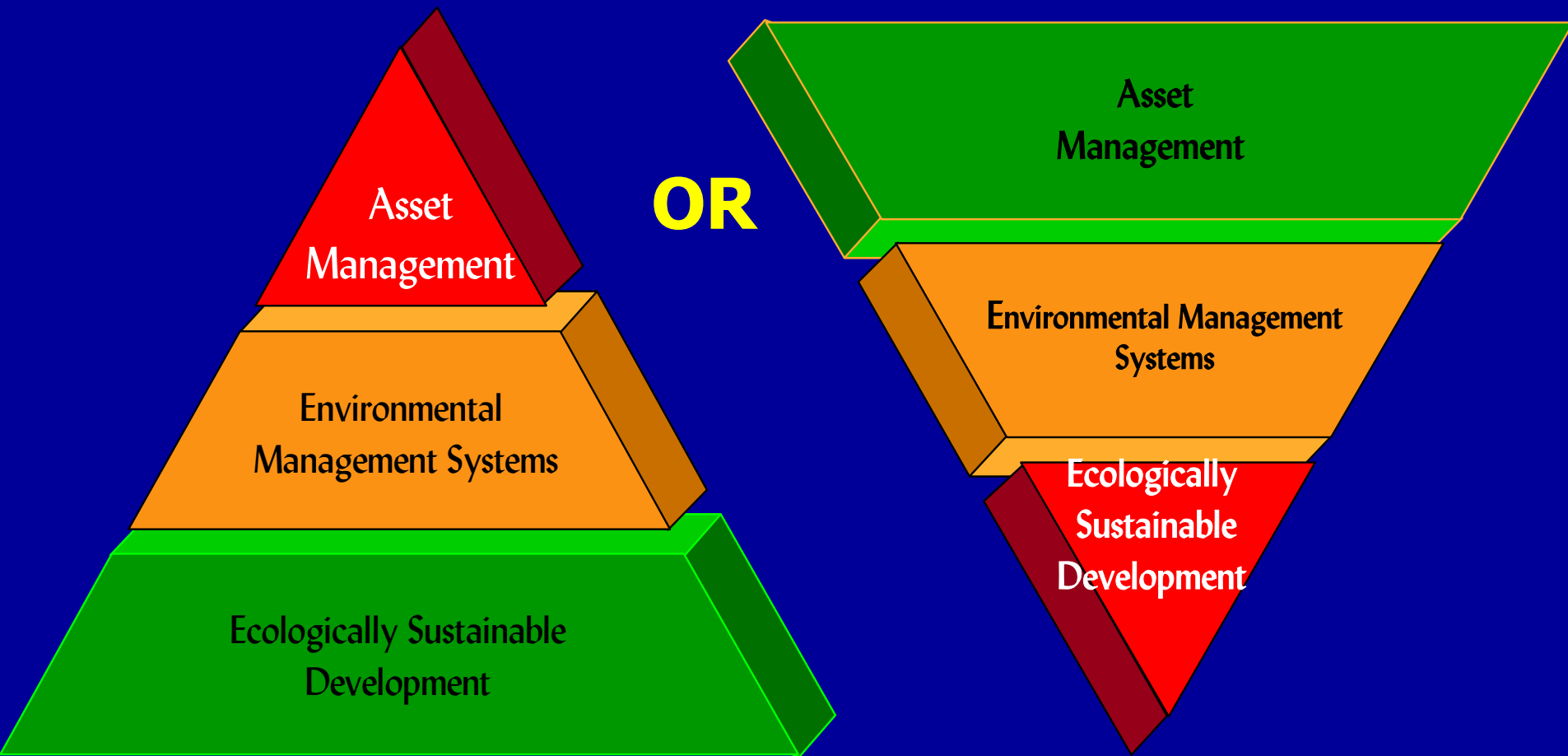
- A structured set of policies, procedures, and practices to reduce an organization's environmental "footprint".

## **◆ Strategic or Total Asset Management.**

- Managing assets to minimize the cost of owning and operating them while continuously delivering the desired or required customer service.

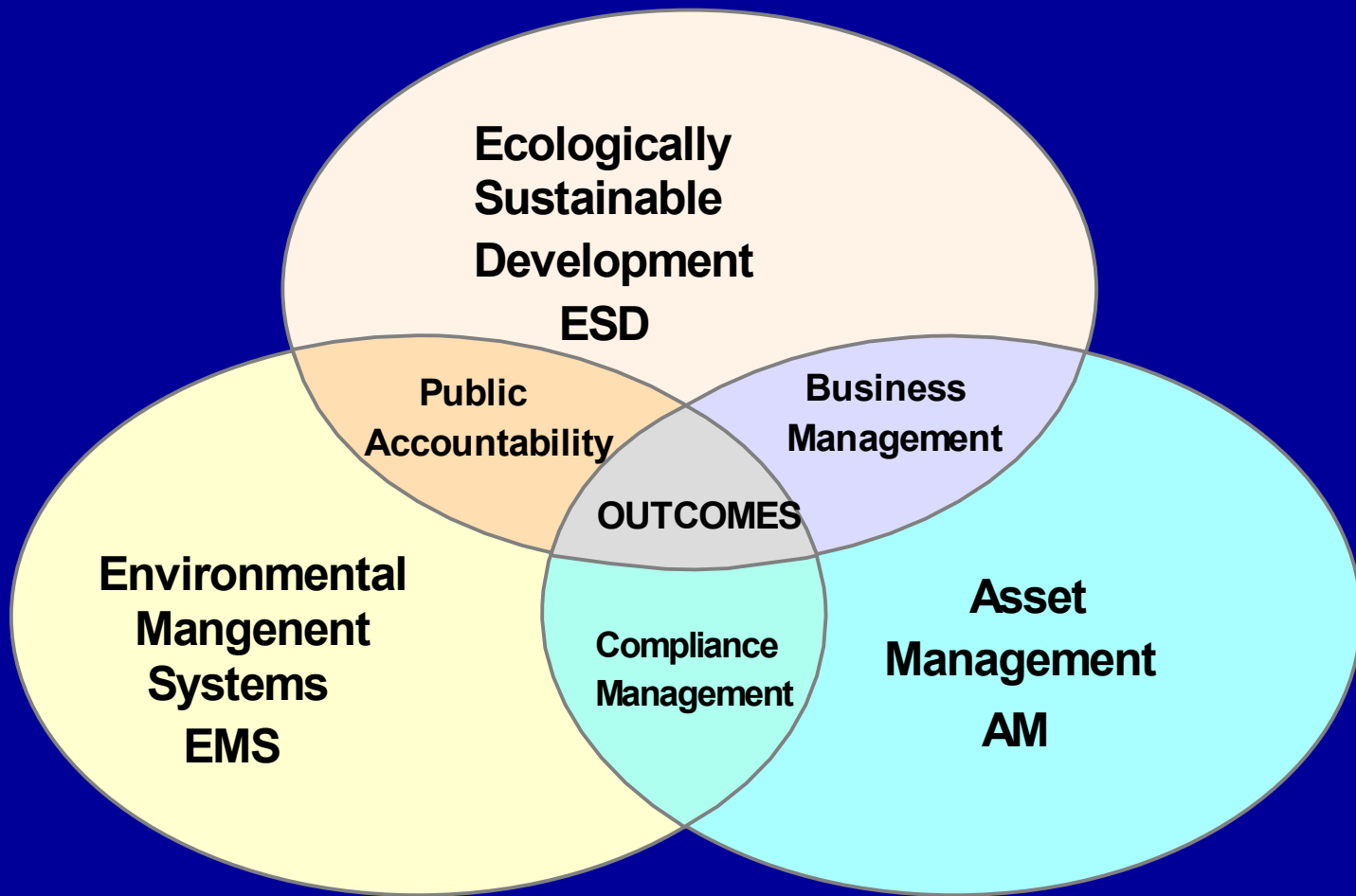
# A (Suitable) View Of The Management Pyramid?

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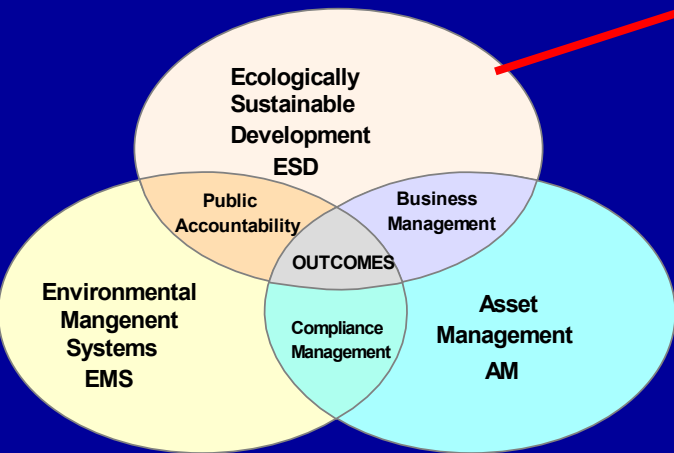


# The Evolving More Holistic View

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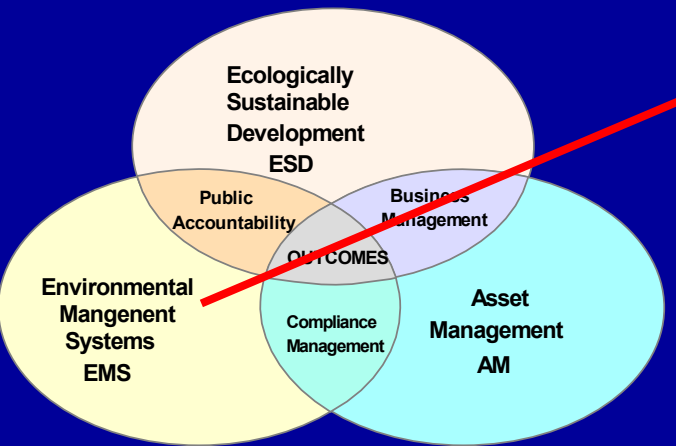
# Integrating The Key Drivers



## Measurable Environmental, Social and Economically Sustainable Business Practices

- The Precautionary Principle.
- Intergenerational and Intragenerational equity.
- Conservation of Biological Diversity and Ecological Integrity.
- Improved Valuation and Pricing of Environmental Resources.

# Integrating The Key Drivers

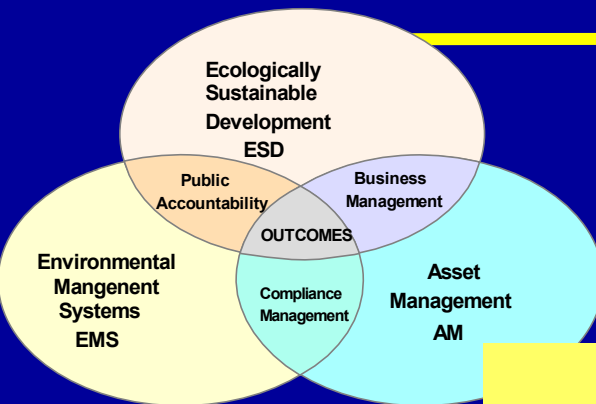


## Structured Set Of Policies, Procedures and Practices

- The Plan-Do-Check-Act approach.
- ISO 14001 most widely used model.
- Global Reporting Initiative Guidelines for Sustainable Reporting.
- Processes and data integrity subjected to third party audit.
- [www.peercenter.net](http://www.peercenter.net)



# Integrating The Key Drivers



## Asset Management

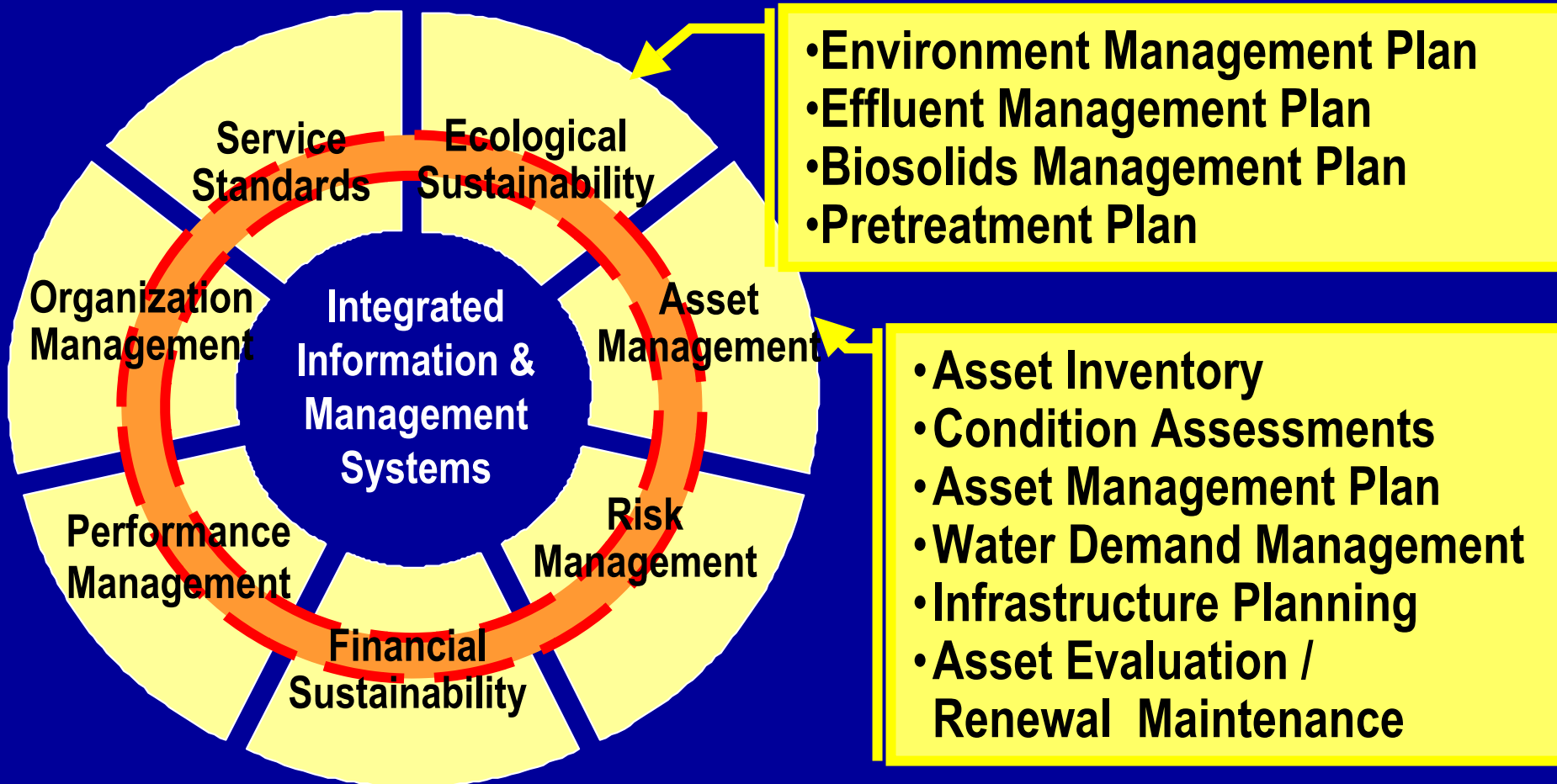
- ◆ Over-arching management *paradigm*.
- ◆ Framework for management of *sustainable infrastructure* and focused customer service.
- ◆ AM is a core business process of corporation.
- ◆ Strategic asset planning is a way of life.
- ◆ Risk/consequence-based decision making.
- ◆ Accountability for condition and performance.
- ◆ Management outcomes with auditable results.

# The Key Characteristics of Sustainable Utilities





# Systems and Organizational Drivers Must Be Integrated To Bring About Efficiency and Reflect Least Cost Strategies





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# **What Might Appropriate Practice Look Like For Smaller & Less Complex Organizations ?**



# Appropriate Practice For Many Organizations Is Taking Steps To Answer Basic Questions

**The knowledge and condition of physical assets?**

**What is the required Level of Service? How might it change?**

**Given the system, what is critical to successful sustained performance?**

**The basic information to chose a minimum life-cycle cost pathway?**

**A fiscal plan for attaining sustainable economic arrangements?**

**1**

**2**

**3**

**4**

**5**



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# Welcome to the World of Asset Management



# Resource Information?

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- ◆ EMS Support: [www.peercenter.net](http://www.peercenter.net)
- ◆ Asset Management Manuals and Handbooks:
  - Managing Public Infrastructure Assets To Minimize Cost and Maximize Performance: AMSA Publication - - [www.amsa-cleanwater.org](http://www.amsa-cleanwater.org)
  - The International Infrastructure Management Manual: [www.ipwea.org.au](http://www.ipwea.org.au)